CLAIMS

1. A dual spin valve sensor for a magnetic head, comprising:

first and second spin valve structures;

a gap layer formed between the first and the second spin valve structures;

the first spin valve structure including:

an antiparallel (AP) pinned layer structure;

a first free layer structure;

a first non-magnetic electrically conductive spacer layer in between the AP pinned layer structure and the free layer structure;

the AP pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

a first antiparallel coupling (APC) layer formed between the first and the second AP pinned layers; and

an antiferromagnetic (AFM) layer formed adjacent the AP pinned layer structure for pinning one of the first and the second AP pinned layers;

the second spin valve structure including:

a second free layer structure;

an antiparallel (AP) self-pinned layer structure;

a second non-magnetic electrically conductive spacer layer in between the second free layer structure and the AP self-pinned layer structure;

the AP self-pinned layer structure including:

a third AP pinned layer;

a fourth AP pinned layer; and

a second antiparallel coupling (APC) layer formed between the third and the fourth AP pinned layers.

2. The dual spin valve sensor of claim 1, wherein the first spin valve structure is formed above the gap layer and the second spin valve structure is formed below the gap layer.

3. The dual spin valve sensor of claim 1, wherein the first spin valve structure is formed above the gap layer with the first free layer structure formed adjacent the gap layer, and wherein the second spin valve structure is formed below the gap layer with the second free layer structure formed adjacent the gap layer.

4. The dual spin valve sensor of claim 1, wherein the second spin valve structure is formed above the gap layer and the first spin valve structure is formed below the gap layer.

5. The dual spin valve sensor of claim 1, wherein the second spin valve structure is formed above the gap layer with the second free layer structure formed adjacent the gap layer, and wherein the first spin valve structure is formed below the gap layer with the first free layer structure formed adjacent the gap layer.

6. The dual spin valve sensor of claim 1, wherein at least one of the first and the second AP pinned layers comprises cobalt-iron iron ($Co_{90}Fe_{10}$).

7. The dual spin valve sensor of claim 1, wherein at least one of the first and the second AP pinned layers comprises cobalt-iron ($Co_{50}Fe_{50}$).

8. The dual spin valve sensor of claim 1, wherein at least one of the first and the second free layer structures comprises nickel-iron and cobalt-iron.

9. A disk drive comprising:

a magnetic head;

a support mounted in the housing for supporting the magnetic head so as to be in a transducing relationship with a magnetic disk;

a spindle motor for rotating the magnetic disk;

an actuator positioning means connected to the support for moving the magnetic head assembly to multiple positions with respect to said magnetic disk;

a processor connected to the magnetic head, to the spindle motor, and to the actuator for exchanging signals with the magnetic head for controlling movement of the magnetic disk and for controlling the position of the magnetic head;

the magnetic head including a read head;

the read head including a dual spin valve sensor which comprises:

first and second spin valve structures;

a gap layer formed between the first and the second spin valve structures;

the first spin valve structure including:

an antiparallel (AP) pinned layer structure;

a first free layer structure;

a first non-magnetic electrically conductive spacer layer in between the AP pinned layer structure and the free layer structure;

the AP pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

a first antiparallel coupling (APC) layer formed between the first and the second AP pinned layers; and

an antiferromagnetic (AFM) layer formed adjacent the AP pinned layer structure for pinning one of the first and the second AP pinned layers;

the second spin valve structure including:

a second free layer structure;

an antiparallel (AP) self-pinned layer structure;

a second non-magnetic electrically conductive spacer layer in between the second free layer structure and the AP self-pinned layer structure;

the AP self-pinned layer structure including:

a third AP pinned layer;

a fourth AP pinned layer; and

a second antiparallel coupling (APC) layer formed between the third and the fourth AP pinned layers.

10. The disk drive of claim 9, wherein the first spin valve structure is formed above the gap layer and the second spin valve structure is formed below the gap layer.

11. The disk drive of claim 9, wherein the first spin valve structure is formed above the gap layer with the first free layer structure formed adjacent the gap layer, and wherein the second spin valve structure is formed below the gap layer with the second free layer structure formed adjacent the gap layer.

12. The disk drive of claim 9, wherein the second spin valve structure is formed above the gap layer and the first spin valve structure is formed below the gap layer.

13. The disk drive of claim 9, wherein the second spin valve structure is formed above the gap layer with the second free layer structure formed adjacent the gap layer, and wherein the first spin valve structure is formed below the gap layer with the first free layer structure formed adjacent the gap layer.

14. The disk drive of claim 9, wherein at least one of the first and the second AP pinned layers comprises cobalt-iron iron ($Co_{90}Fe_{10}$).

15. The disk drive of claim 9, wherein at least one of the first and the second AP pinned layers comprises cobalt-iron ($Co_{50}Fe_{50}$).

16. The disk drive of claim 9, wherein at least one of the first and the second free layer structures comprises nickel-iron and cobalt-iron.

17. A dual/differential spin valve sensor, comprising:

first and second spin valve structures;

a gap layer formed between the first and the second spin valve structures;

the first spin valve structure including:

an antiferromagnetic (AFM) pinning layer;

an antiparallel (AP) pinned layer structure formed below the AFM pinning layer;

a first free layer structure formed above the gap layer;

a first non-magnetic electrically conductive spacer layer in between the AP pinned layer structure and the free layer structure;

the AP pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

wherein one of the first and the second AP pinned layers is pinned by the AFM layer;

a first antiparallel coupling (APC) layer formed between the first and the second AP pinned layers; and

the second spin valve structure including:

a second free layer structure formed below the gap layer;

an antiparallel (AP) self-pinned layer structure;

a second non-magnetic electrically conductive spacer layer in between the second free layer structure and the AP self-pinned layer structure;

the AP self-pinned layer structure including:

a third AP pinned layer;

a fourth AP pinned layer;

a second antiparallel coupling (APC) layer formed between the third and the fourth AP pinned layers; and

wherein one of the third and the fourth AP pinned layers is pinned by magnetostriction and air bearing surface (ABS) stress.

18. The dual/differential spin valve sensor of claim 17, wherein no AFM pinning layer is needed for pinning the AP self-pinned layer structure.

19. The dual/differential spin valve sensor of claim 17, wherein the AFM pinning layer comprises PtMn.

20. The dual/differential spin valve sensor of claim 17, further comprising:

a seed layer formed underneath the AP self-pinned layer structure.

21. The dual/differential spin valve sensor of claim 17, further comprising:

a seed layer formed underneath the AP self-pinned layer structure; and

the seed layer including a platinum-manganese (PtMn) layer which has no pinning effect on the AP self-pinned layer structure.

22. The dual/differential spin valve sensor of claim 17, wherein the first and the second AP pinned layers comprise CoFe.

23. The dual/differential spin valve sensor of claim 17, wherein the first and the second free layer structures comprise NiFe and CoFe.

24. A dual/differential spin valve sensor, comprising:

first and second spin valve structures;

a gap layer formed between the first and the second spin valve structures;

the first spin valve structure including:

an antiparallel (AP) self-pinned layer structure;

a first free layer structure formed above the gap layer;

a first non-magnetic electrically conductive spacer layer in between the AP self-pinned layer structure and the first free layer structure;

the AP self-pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

a first antiparallel coupling (APC) layer formed between the first and the second AP pinned layers;

wherein one of the first and the second AP pinned layers is pinned by magnetostriction and air bearing surface (ABS) stress;

the second spin valve structure including:

a second free layer structure formed below the gap layer;

an antiparallel (AP) pinned layer structure;

a second non-magnetic electrically conductive spacer layer in between the second free layer structure and the AP pinned layer structure;

an antiferromagnetic (AFM) pinning layer formed below the AP pinned layer structure;

the AP pinned layer structure including:

a third AP pinned layer;

a fourth AP pinned layer;

wherein one of the third and the fourth AP pinned layers is pinned by the AFM pinning layer; and

a second antiparallel coupling (APC) layer formed between the third and the fourth AP pinned layers.

25. The dual/differential spin valve sensor of claim 17, wherein no AFM pinning layer is needed for pinning the AP self-pinned layer structure.

26. The dual/differential spin valve sensor of claim 17, wherein the AFM pinning layer comprises PtMn.

27. The dual/differential spin valve sensor of claim 17, further comprising:

a seed layer formed underneath the second APC layer.

28. The dual/differential spin valve sensor of claim 17, further comprising:

a seed layer formed underneath the second APC layer; and

the seed layer including a platinum-manganese (PtMn) layer which has no pinning effect on the AP self-pinned layer structure.

29. The dual/differential spin valve sensor of claim 17, wherein the first and the second AP pinned layers comprise CoFe.

30. The dual/differential spin valve sensor of claim 17, wherein the first and the second free layer structures comprise NiFe and CoFe.